

2.2 limits involving infinity

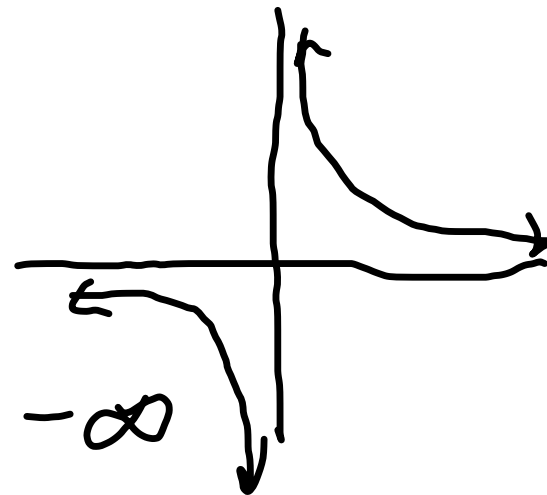
vertical asymptotes p 72 definition

$$\lim_{x \rightarrow 0} \frac{1}{x} = \text{dne}$$

$$\lim_{x \rightarrow 0^+} \frac{1}{x} = \infty$$

(right)

$$\lim_{x \rightarrow 0^-} \frac{1}{x} = -\infty$$

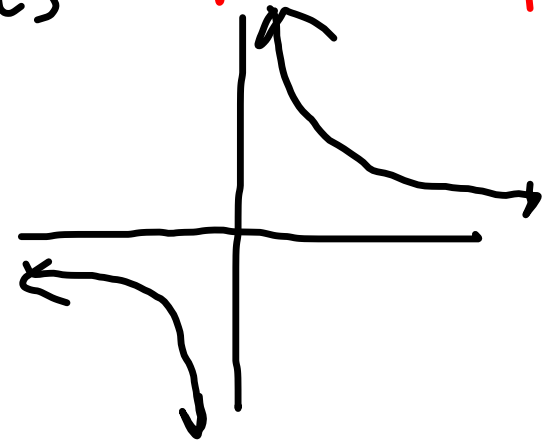


V. A $x=0$

horizontal asymptotes

70 def

$$\lim_{x \rightarrow \infty} \frac{1}{x} = 0$$



or

$$\lim_{x \rightarrow -\infty} \frac{1}{x} = 0$$

H.A. is $y = 0$

find asymptotes for
(do algebraically)

$$y = \frac{2x+1}{x}$$

$$y = 2 + \frac{1}{x}$$

Horiz $\lim_{x \rightarrow \infty} 2 + \frac{1}{x} = 2$

$$\lim_{x \rightarrow -\infty} 2 + \frac{1}{x} = 2$$

HA $y = 2$

VA $x = 0$

vert
hint: look for
division by 0

$$\lim_{x \rightarrow 0^+} 2 + \frac{1}{x} = \infty$$

$$\lim_{x \rightarrow 0^-} 2 + \frac{1}{x} = -\infty$$

find asymptotes

$$y = \frac{x+1}{2x-1}$$

horiz
end
behavior or

$$\lim_{x \rightarrow \infty} \frac{x+1}{2x-1} = \frac{1}{2}$$

$$HA \quad y = \frac{1}{2}$$

$$\lim_{x \rightarrow -\infty} \frac{x+1}{2x-1} = \frac{1}{2}$$

vert
÷ by 0

$$\lim_{x \rightarrow \frac{1}{2}^+} \frac{x+1}{2x-1} = \infty$$

VA

$$x = \frac{1}{2}$$

$$\lim_{x \rightarrow \frac{1}{2}^-} \frac{x+1}{2x-1} = -\infty$$

do graphically
fig 2.11

$$\lim_{x \rightarrow \infty} \frac{\sin x}{x}$$



HA

$$y = 0$$

$$\lim_{x \rightarrow \infty} \frac{\sin x}{x} = 0$$

compare

$$\lim_{x \rightarrow \infty} \frac{1}{x} = 0$$

end behavior models

Ex 6 $y = \frac{3x^4 - 2x^3 + 3x^2 - 5x + 6}{3x^4}$

HA: $\lim_{x \rightarrow \infty} y = 1$

HA $y = 1$

look at
ex 7

also an
end behavior
model